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JAN TRANSISTOR AND DIODE CHARACTERIZATION TEST PROGRAM

FINAL REPORT
FOR
JANTX DIODE

1N5623

FEBRUARY 1977
Prepared
for

GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Marshall Space Flight Center, Alabama 35812

MSFC/NASA CONTRACT No. NAS8-31944

by

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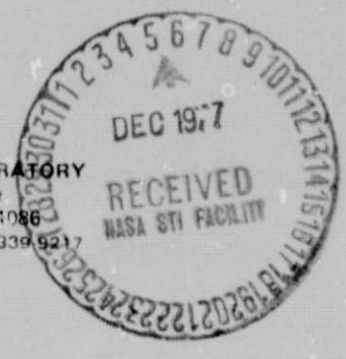

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FORWARD

This report is a statistical summary of the electrical characterization performed on NASA Contract NA8-31944. This is one of a group of thirty-nine (39) such reports prepared on selected JAN and JANTX Transistors and Diodes for the George C. Marshall Space Flight Center, Huntsville, Alabama. The Contracting Officer's Technical Representative was Mr. Howard B. Meeks.

This work was performed by DCA Reliability Laboratory, Special Products Division, Sunnyvale, California under the management of Mr. Robert Starr with the special assistance of Mr. Barry Lorenzo, Mr. Kenneth Radford and Mr. Hiroharu Takeda.

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1.0 INTRODUCTION

The objective of this characterization program is to provide the necessary data to create a new class of 19500 detail specifications "JAN A CLASS".

1.1 SAMPLE SELECTION

Sample selection was made according to the following criteria:

1. Manufacturer or qualified distributor.
2. Two vendors.
3. Two date codes.

1.2 PROCUREMENT GUIDELINES

The general guidelines for procurement were:

1. Two QPL vendors
2. JAN or JANTX
3. Two (2) manufacturing lots (Date Codes), twenty-seven (27) from each lot.

2.0 TECHNICAL SUMMARY

The devices used in this report were JANTX 1N5623 Silicon Diodes manufactured by Micro Semiconductor and Semtech.

All data was acquired with three (3) digit accuracy. The data processing and calculation of statistical parameters was performed by the Tektronix S-3260 computer system using four (4) digit display.

2.1 TEST PARAMETERS AND CONDITIONS

2.1.1 I_R V_R = 1000V = (Max. Rated V_R) T_A = 25°C & 150°C

2.1.2 V_{F1} I_F = 300mA = (10% of Rated I_F) T_A = 25°C & -65°C

2.1.3 V_{F2} I_F = 1.5AMP (50% of Rated I_F) T_A = 25°C & -65°C

2.1.4 V_{F3} I_F = 3.0AMP (100% of Rated I_F) T_A = 25°C & -65°C

2.1.5 C_{o1} V_R = 0V f = 100KHZ T_A = 25°C

2.1.6 C_{o2} V_R = 0V f = 1MHZ T_A = 25°C

2.1.7 t_{rr} T_A = 25°C

2.2 UNIT DEFINITIONS

NAME	SYMBOL	MULTIPLIER
Kilo	K	10^{3}
Milli	M	10^{-3}
Micro	U	10^{-6}
Nano	N	10^{-9}
Pico	P	10^{-12}

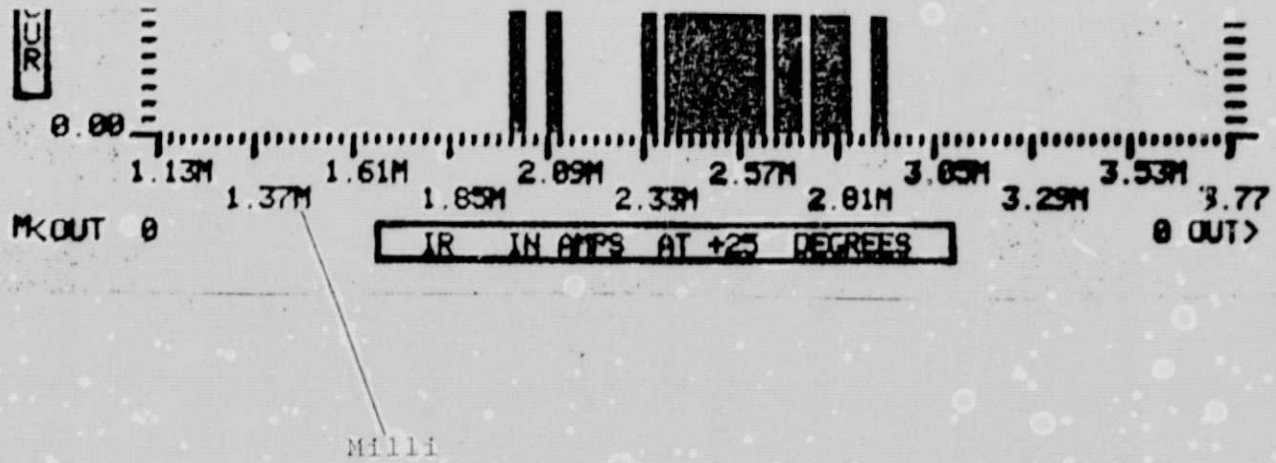
Example using a statistical summary section:

IR IN AMPS AT 25 DEGREES
AT VR=2.64 VOLTS

MOTO/ 7603	2.534M	218.7U	2.010M	2.090M	2.780M	
MOTO/ 7550	2.423M	276.9U	2.010M	2.030M	2.780M	
SIEM/ 7508	2.997M	426.5U	1.820M	2.490M	3.460M	

Milli Micro

Example using a histogram:



Milli

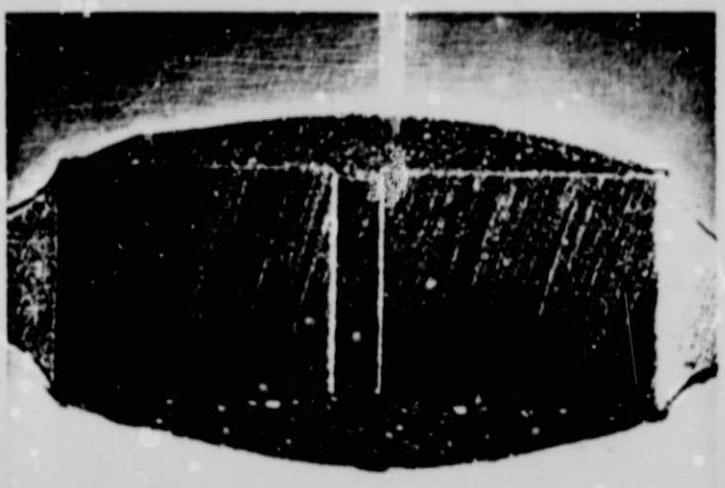


FIGURE 1

Device Number: IN5623 Typical Overall Cross-
25 Diameters Sectional View
D/C 7531 MFR: Semtech S/N E027789

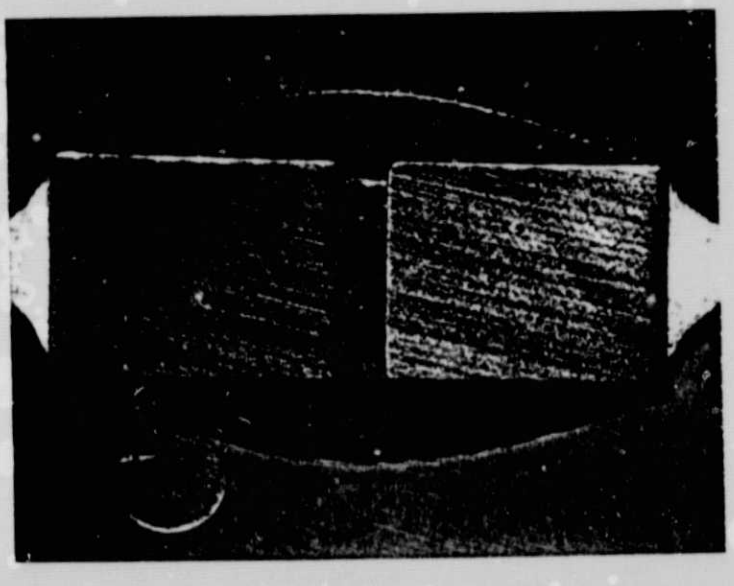


FIGURE 2

Device Number: IN5623 Typical Overall Cross-
25 Diameters Sectional View
D/C 7631 MFR: Semtech S/N E027816

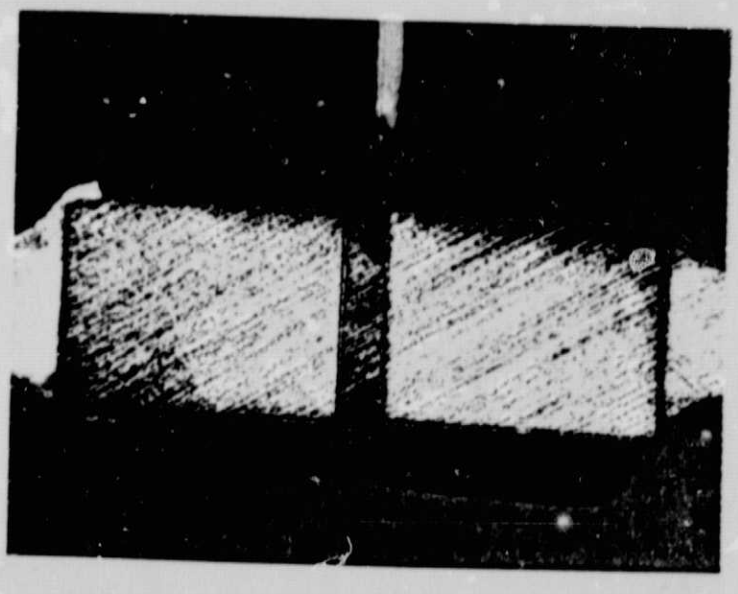


FIGURE 3

Device Number: IN5623
27 Diameters
D/C 7633

MFR: MSC

Typical Overall Cross-Sectional View
S/N E027843

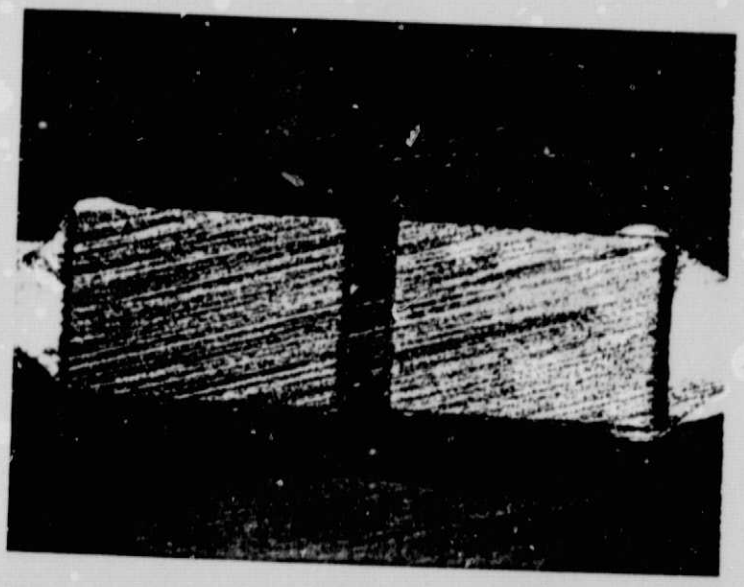


FIGURE 4

Device Number: IN5623
27 Diameters
D/C 7634

MFR: MSC

Typical Overall Cross-Sectional View
S/N E027870

3.0 STATISTICAL SUMMARY

The Statistical Summary, pages 3-2 to 3-4, are a consolidated presentation of the data acquired formatted for easy Vendor to Vendor and date code to date code analysis. Each parameter is presented with Test Conditions, Mean, Standard Deviation, Lowest Reading, 10% Point (where 10% of all readings are equal to or less than the indicated reading), 90% Point (where 90% of all readings are equal to or less than indicated reading) and the Highest Reading.

It should be noted the Mean presented in the summary may vary slightly from that presented on the Histograms due to a slight variation in the data base used for calculation.

EXAMPLE:

MICRO SEMICONDUCTOR:	I_R	V_R = 1000V	T_A = 25°C
Summary:	MEAN	1.500uA	
Histogram:	MEAN	340.4nA	

DCA RELIABILITY LABORATORY

PART NUMBER :1N5623

VENDOR :MICRO SEMICOND — DATE CODE : 7634

VENDOR :MICRO SEMICOND — DATE CODE : 7633

VENDOR :SEMTECH — DATE CODE : 7631

VENDOR :SEMTECH — DATE CODE : 7531

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
IR IN AMPS AT 25 DEGREES AT VR=1000 VOLTS						
MSI / 7634	1.500U	5.238U	207.0N	248.0N	481.0N	25.50U
MSI / 7633	5[illegible]N	414.6N	303.0N	323.0N	498.0N	2.520U
SEMI/ 7631	[illegible]N	59.17N	19.70N	20.30N	96.80N	309.0N
SEMT/ 7531	76.31N	75.15N	5.500N	9.990N	113.0N	290.0N
IR IN AMPS AT 150 DEGREES AT VR=1000 VOLTS						
MSI / 7634	179.7U	51.59U	105.0U	132.0U	197.0U	388.0U
MSI / 7633	216.7U	80.74U	81.10U	89.10U	303.0U	357.0U
SEMT/ 7631	31.47U	10.90U	16.16U	20.10U	40.30U	63.60U
SEMT/ 7531	47.36U	20.24U	23.90U	24.30U	71.10U	99.90U
VF1 IN VOLTS AT 25 DEGREES AT IF=300 MA						
MSI / 7634	1.019	45.28M	928.0M	956.0M	1.070	1.090
MSI / 7633	998.8M	52.14M	914.0M	928.0M	1.060	1.060
SEMT/ 7631	804.5M	166.5M	807.0M	808.0M	866.0M	933.0M
SEMT/ 7531	787.6M	181.1M	813.0M	822.0M	821.0M	881.0M

DCA RELIABILITY LABORATORY

PART NUMBER :1N5623

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.
VF1 IN VOLTS AT -65 DEGREES AT IF=300 MA						
MSI / 7634	1.085	28.40M	1.020	1.040	1.120	1.140
MSI / 7633	1.068	34.57M	999.0M	1.020	1.110	1.120
SEMT/ 7631	953.4M	9.152M	937.0M	940.0M	961.0M	979.0M
SEMT/ 7531	2.449	7.259	951.0M	951.0M	984.0M	985.0M
VF2 IN VOLTS AT 25 DEGREES AT IF=1.5 AMPS						
MSI / 7634	1.295	61.26M	1.150	1.200	1.360	1.390
MSI / 7633	1.260	75.44M	1.130	1.150	1.340	1.350
SEMT/ 7631	1.045	48.44M	978.0M	983.0M	1.090	1.170
SEMT/ 7531	1.015	212.7M	962.0M	964.0M	1.110	1.140
VF2 IN VOLTS AT -65 DEGREES AT IF=1.5 AMPS						
MSI / 7634	1.325	49.06M	1.220	1.260	1.370	1.420
MSI / 7633	1.291	60.62M	1.190	1.190	1.350	1.380
SEMT/ 7631	1.154	25.15M	1.110	1.120	1.180	1.190
SEMT/ 7531	2.648	7.218	1.120	1.120	1.220	1.250
VF3 IN VOLTS AT 25 DEGREES AT IF=3.0 AMPS						
MSI / 7634	1.475	80.78M	1.290	1.350	1.560	1.600
MSI / 7633	1.428	109.2M	1.260	1.290	1.530	1.550
SEMT/ 7631	1.217	63.47M	1.120	1.120	1.280	1.370
SEMT/ 7531	1.180	248.3M	1.120	1.120	1.300	1.370

PART NUMBER :1N5623

VEND / DC	MEAN	STD. DEV.	LOW PT	10% PT	90% PT	HIGH PT.

VF3 IN VOLTS AT -55 DEGREES
AT IF=3.0 AMPS

MSI / 7634	1.509	70.90M	1.360	1.370	1.580	1.640
MSI / 7633	1.456	90.02M	1.300	1.330	1.560	1.580
SEMT/ 7631	1.325	59.67M	1.210	1.240	1.400	1.450
SEMT/ 7531	2.809	7.186	1.240	1.240	1.440	1.530

C01 FARADS AT 25 DEGREES
AT 100 KHZ AND VR=0 VOLTS

MSI / 7634	13.72P	7.043P	7.360P	8.380P	19.06P	38.00P
MSI / 7633	10.99P	3.336P	5.950P	6.050P	16.50P	18.36P
SEMT/ 7631	58.75P	8.590P	47.03P	49.03P	72.43P	75.20P
SEMT/ 7531	55.87P	5.911P	47.29P	49.55P	59.62P	73.44P

C02 FARADS AT 25 DEGREES
AT 1M HZ AND VR=0 VOLTS

MSI / 7634	9.133P	2.467P	5.850P	6.090P	12.03P	13.60P
MSI / 7633	7.962P	2.471P	4.770P	4.860P	10.09P	17.79P
SEMT/ 7631	48.59P	2.158P	44.42P	45.72P	51.18P	52.45P
SEMT/ 7531	48.59P	2.172P	44.72P	45.00P	50.89P	53.94P

TRR IN SEC.S AT 25 DEGREES

MSI / 7634	230.9N	9.491N	220.0N	220.0N	240.0N	250.0N
MSI / 7633	231.6N	13.17N	200.0N	220.0N	250.0N	250.0N
SEMT/ 7631	397.4N	50.66M	310.0N	310.0N	460.0N	480.0M
SEMT/ 7531	326.8N	60.87M	230.0N	230.0N	400.0N	450.0N